HABITAT

VIABLE HABITAT IS THE most basic life requirement for all birds, fish and other animals. Without adequate food, water and shelter, no fish or wildlife species can survive, much less flourish, even under the most careful management.

Natural habitat is a fundamental requirement for fish and wildlife, and a major focus of attention for the state's salmon recovery efforts.

But as human populations have grown and expanded into new areas, Washington and other states have lost a great deal of native fish and wildlife habitat. In the past century alone, Washington lost more than 80% of its native old-growth forests, displacing a range of animals from marbled murrelet to caribou. In eastern Washington, agriculture and other human activities consumed 60% of the native shrub steppe, while 95% of western Washington's native prairie grasslands are now gone. In a state renown for its native salmon runs, dams impede migration on the Columbia, Snake and other major rivers, hundreds of rivers fail to meet clean water standards and others run dry in summer for lack of established in-stream flows.

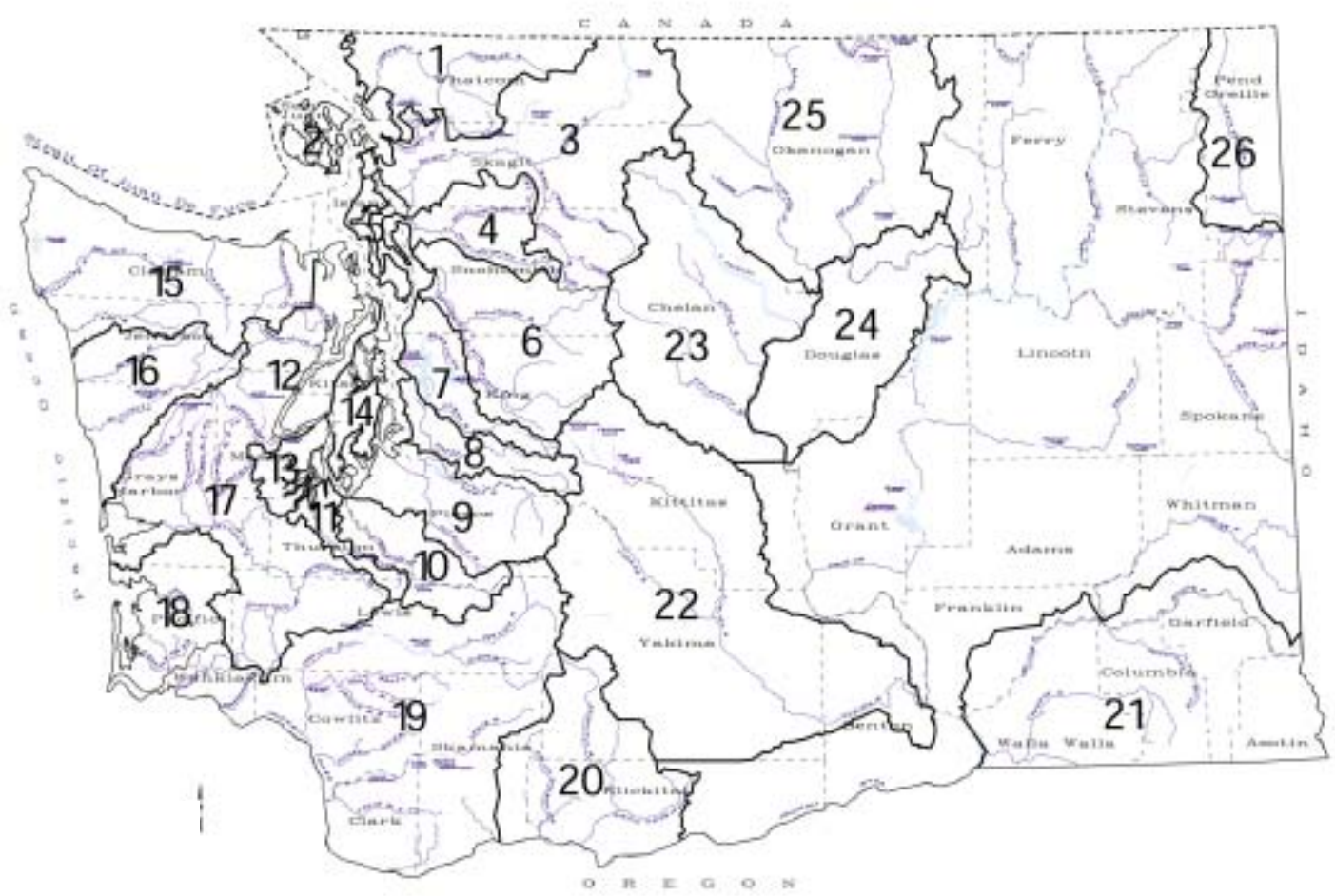
As the 20th century drew to a close, the Washington State Legislature took action to address these conditions, particularly those affecting habitat for wild salmon populations. Anticipating the listing of a number of new salmon populations under the federal Endangered Species Act (ESA), the 1998 Legislature approved the Salmon Recovery Act (HB 2496), which established a network of regional salmon recovery groups to coordinate habitat restoration work on local watersheds throughout the state. In 1999, the Legislature created the Salmon Recovery Funding Board (SRFB) to prioritize funding for projects proposed by the new regional restoration groups, designated as "Lead Entities" in the state's salmon recovery effort. It also adopted the landmark Forest and Fish Agreement, which established new standards for logging practices that affect habitat for fish and wildlife.

All of these measures called upon biologists from the Washington Department of Fish and Wildlife (WDFW) to deliver a range of scientific findings and technical services critical to the success of the new recovery effort. Meeting that challenge was a top priority for WDFW in the 1999-01 Biennium.

To ensure that the new Lead Entities and other salmon-recovery organizations received the help they needed, the agency formed a dedicated team of biologists to provide assistance in areas ranging from stream assessment to project planning and implementation. At the same time, a separate team of WDFW biologists was formed to support and monitor key elements of the Forest and Fish Agreement, which incorporates a flexible "adaptive management" approach to timber practices that allows for adjustments in forestry rules as new scientific information becomes available.

By the end of the biennium, the Department was engaged in a range of new partnerships, involving salmon-recovery groups, farmers, foresters, treaty

Washington State Lead Entity Organizations (2001)



Lead Entity Organizations

1 Whatcom County
2 San Juan Conservation District
3 Skagit Watershed Council
4 Snohomish County and Stillaguamish Trice (WRIA 5)
5 Island County Public Works
6 Snohomish County (WRIA 7)
7 King County (WRIA 8)
8 King County (WRIA 9)
9 Pierce County
10 Nisqually River Salmon Recovery
11 Thurston Conservation District
12 Hood Canal Coordinating Council
13 Mason Conservation District
14 Kitsap County
15 North Olympic Pennisula LE
16 Quinault Indian Nation
17 Grays Harbor County
18 Pacific County
19 Lower Columbia Fish Recovery Board
20 Klickitat County
21 Snake River Salmon Recovery Board
22 Yakima River Basin Salmon Recovery Board
23 Chelan County
24 Foster Creek Conservation District
25 Okanogan County and Colville Tribe
26 Pend Oreille Conservation District

tribes, irrigators, local governments and other state and federal agencies. In all of these efforts, WDFW's chief contribution was the scientific and technical expertise provided by Department biologists from a wide range of disciplines.

Habitat Program Funding and Personnel, 1999-01 Biennium

(dollars in thousands)	GF-S		OTHER FUNDS		TOTAL	
Division	**Funding**	**FTEs**	**Funding**	**FTEs**	**Funding**	**FTEs**
Administration	$1,325	11	$358	2	$1,683	13
Environmental Services	$2,676	18	$1,256	8	$3,932	26
Major Projects	$811	6	$1,355	12	$2,166	18
Environmental Restoration	$2,433	16	$1,311	9	$3,744	25
Habitat Science Team	$96	1	$250	13	$346	14
Regional	$6,364	48	$1,446	18	$7,810	66
SSHEAR	$1,846	11	$1,054	1	$2,900	12
Belated Claims	$26	--	--	--	$26	--
TOTAL	**$15,577**	**111**	**$7,030**	**63**	**$22,607**	**174**

In addition to supporting these new initiatives, the agency maintained its commitment to protect and restore fish and wildlife habitat through ongoing programs and activities administered by the WDFW Habitat Program. As administrator for the state's hydraulics code, WDFW reviewed thousands of projects for compliance with state environmental laws while streamlining permitting requirements for critical transportation projects. Other sections within the Habitat Program took the lead in correcting major barriers to fish passage, ensuring adequate mitigation for hydroelectric projects and responding to oil spills in state waters.

The Habitat Program's 1999-01 operating budget totaled $22.6 million, of which $15.58 million came from the State General Fund. The remainder came from other state, local and federal funds. The Program's 174 FTE staff members are spread among the Department's headquarters in Olympia and six regional offices, where they provided direct services to landowners, treaty tribes, fishers and conservation groups as well as state, local and federal governments.

Whether processing hydraulic permits, surveying forest lands or supporting locally based salmon-recovery groups, employees of the WDFW Habitat Program have been active partners in the statewide effort to protect and restore fish and wildlife habitat.

WDFW makes support for Lead Entities a top priority

Recognizing the critical role Lead Entities would play in the future of salmon recovery, WDFW made their success a top priority for the agency in the 1999-01 Biennium. WDFW assistance for the new network of local organizations was coordinated directly through the Office of the Director, which received $2.45 million in state funding to support their operations during the biennium.

In addition to providing scientific and technical support for regional projects, WDFW also helped to reinforce the new salmon-recovery network in other ways. Recognizing, for example, that effective communication would be critical to the new regional recovery effort, WDFW established the Lead Entity Advisory Group (LEAG) to foster ties among Lead Entities, between Lead Entities and state agencies, and between Lead Entities and the Salmon Recovery Funding Board.

WDFW also played a major role in expanding the network of Lead Entities during the 1999-01 Biennium by helping to create four new ones to serve previously unrepresented areas of the state. The new Lead Entities include the San Juan Conservation District, the Foster Creek Conservation District, the Pend Oreille Conservation District and the Yakima River Basin Salmon Recovery Board.

Watershed Stewardship Team

WDFW served as a source of scientific and technical expertise for local watershed-restoration activities long before the Salmon Recovery Act was passed into law in 1998. Department habitat biologists had been working since 1990 with 14 established Regional Fisheries Enhancement Groups (RFEGs) to help these volunteer organizations make the most of their efforts to restore streambank vegetation, replace fish-blocking culverts, plant salmon carcasses to provide key nutrients and a variety of other activities. Habitat Program staff also worked one-on-one with individuals seeking Hydraulic Project Approval (HPA) for specific projects, with citizen volunteers and with local governments seeking to comply with state environmental and growth management laws.

But the new network of local salmon-recovery organizations established by HB 2496 in 1998 represented a new level of commitment by both the state and WDFW. In the 1999-01 Biennium, the newly created Salmon Recovery Funding Board distributed $92 million to fund 510 salmon-recovery projects recommended by local Lead Entities throughout the state. To help these groups make the most of that funding, WDFW re-directed existing staff to form the Watershed Stewardship Team (WST), comprised of 14 biologists assigned to provide technical assistance to Lead Entities, RFEGs and local watershed groups in disciplines ranging from salmon biology and habitat restoration to project administration and community relations.

As part of that effort, WST members helped Lead Entities, RFEGs and other local watershed groups to:

- Develop strategies for improving and restoring habitat within given watersheds.
- Review, prioritize and select projects for proposed funding.
- Develop recovery plans.
- Review Limiting Factors Analyses on 26 watersheds to assess their potential for salmon recovery.
- Make presentations to landowners and volunteer groups.
- Find the services needed from WDFW, whether from habitat biologists, fish management staff, agency engineers, instream flow specialists or other professional staff.

In addition to providing support for established Lead Entities, WDFW also helped to create four new ones to serve previously unrepresented areas of the state. The 26 Lead Entities in existence by the end of 2001 included 13 counties, five conservation districts, three tribes and five non-profit watershed-restoration groups.

Regional Fisheries Enhancement Group Boundaries

Environmental Restoration

While the Watershed Stewardship Team was created to provide front-line technical support for Lead Entities and other local salmon recovery groups, team members and the organizations they serve routinely draw on expertise throughout the Department. A major source of that expertise is the Habitat Program's Environmental Restoration Division, which has a staff of 80 biologists, engineers, welders, heavy equipment operators

and other specialists experienced in all types of habitat-restoration projects.

Throughout the Biennium, the Department's Environmental Restoration Division responded to hundreds of calls for assistance from salmon recovery groups, local governments and landowners on issues ranging from stream hydrology to engineering. The division also offered dozens of training sessions on conducting fish passage inventories and assessments attended by representatives of local resource recovery groups, local governments, conservation districts, treaty tribes, fishing groups and others.

Meanwhile, division staff continued work on a number of high-priority projects that support state, local, and federal initiatives to maintain and restore wild salmonid populations and their habitat. Since the mid-1980s, the division has worked with the Washington State Department of Transportation (WSDOT) to correct or replace 64 highway culverts, opening up hundreds of miles of salmon habitat. It has also worked with irrigators to screen water diversions – mostly in eastern Washington – that can present a hazard to migrating salmon. Work completed by the division within the 1999-01 Biennium includes:

"Hanging culverts" like this one present a major barrier to fish passage and are being replaced through a partnership with the Washington Department of Transportation.

- Completion of 25 major fish passage projects, including replacement of inadequate culverts and restoration of former stream reaches. These projects were conducted in cooperation with WSDOT, county governments and others.
- Fabrication and installation of 15 major irrigation diversion screens to protect salmon in eastern Washington streams, where water is diverted for agricultural purposes.

WDFW projects aim to boost salmon survival

Two projects completed by the WDFW Environmental Restoration and Engineering divisions illustrate the Department's focus on improving salmon habitat and correcting barriers to fish passage during the 1999-01 Biennium.

Deepwater Slough

In the fall of 2000, WDFW in concert with the U.S. Army Corps of Engineers and the Skagit System Cooperative completed a major part of a renovation project at the Skagit Wildlife Area, opening up 250 acres of prime estuarine habitat to juvenile salmon on the south fork of the Skagit River. The Deepwater Slough project, which involved breaching or removing some 14,000 feet of dikes and shoring up others, is expected to substantially improve survival rates for young Skagit River chinook and coho salmon while also protecting a popular hunting area against flooding.

Ballard Locks

For years, salmon smolts suffered high mortality rates at the Ballard Locks in Seattle when they were drawn into the facility's barnacle-encrusted piping system as the locks filled with water. In the summer of 2000, WDFW took action to solve this problem through a joint effort with the U.S. Army Corps of Engineers, the National Marine Fisheries Service, the Muckleshoot Tribe and local governments. Four "smolt slides" were installed, allowing young salmon to bypass the lock chambers and avoid being drawn into the constricted pipes. Initial indications are that fish fatalities have dropped substantially, and WDFW continues to monitor the long-term success of the project.

- Inventory of fish passage and screening problems in three WDFW Wildlife Areas, on Jefferson County-owned road crossings, on road crossings owned by WSDOT in six Water Resource Inventory Areas and in several watersheds in the Skagit and Olympic Peninsula of Washington.
- Inspection of 470 fishways and 140 screens on an annual basis, with followup maintenance on 80 fishways and 40 screens.

The division also maintained the statewide fish passage database, which is used to store information about fish passage barriers that is used by WDFW, Lead Entities and other state agencies and organizations. Among its many purposes, the database serves as a foundation for prioritizing remedies for fish-passage barriers.

Technical Guidelines

Accurate, helpful information is critical to the success of habitat protection and restoration projects, whether the work is undertaken by individual landowners, local governments, regional recovery groups or others involved in the recovery process. During the 1999-01 Biennium, WDFW worked to expand its existing archive of technical guidelines to provide the best available science to project managers throughout the state.

PHS Program

Since it was first created in 1989, the WDFW Priority Habitats and Species (PHS) Program has served as the principal means for disseminating technical information about fish, wildlife and their habitat needs to the public. During the 1999-01 Biennium, PHS staff produced and distributed more than 8,000 copies of the *Priority Habitats and Species List*, which identifies priority species and habitats, 5,000 state-of-the-art GIS maps which display the locations of those species and more than 7,000 copies of *Management Recommendations for Washington's Priority Habitats and Species.*

One section of the management guidelines has become a virtual handbook for local officials in developing ordinances for riparian areas, and was hailed by the Seattle University Law Review as a prime example of "best management practices" in that area. In addition, PHS information was used to screen thousands of Forest Practices Applications, Hydraulic Project Approvals and State Environmental Policy Act reviews during the biennium. A majority of Washington's cities and counties used PHS information to develop ordinances consistent with the Growth Management Act and PHS also was used to guide statewide oil spill prevention and response efforts.

Aquatic Habitat Guidelines

In 1999, as more organizations and individuals were becoming involved in salmon recovery, the Governor's Statewide Salmon Recovery Strategy called on WDFW and two other agencies to develop a series of new technical guidelines that lay out best practices for recovery projects. Throughout the 1999-01 Biennium, WDFW worked with the state departments of Ecology and Transportation – joined by the U.S. Army Corps of Engineers in 2001 – to develop a practical set of guidelines that employ an integrated approach to marine, freshwater, and riparian habitat protection and restoration.

Draft guidelines on four topics initially identified were completed in mid-2001 and have been posted on WDFW's Aquatic Habitat Guidelines website (*http://www.wa.gov/wdfw/hab/ahg/).* Those drafts, which are scheduled for publication in early 2002, include: *Fishway Guidelines for Washington State, Fish Passage Design at Road Culverts, Fish Protection Screen Guidelines for Washington State,* and *Integrated Streambank Protection Guidelines.* Development of a fifth and final guideline, *Stream Habitat Restoration and Channel Design,* was initiated late in the biennium and is scheduled for publication in the summer of 2002.

In addition, seven papers identifying possible future guidelines were completed. They include *Marine Overwater Structures, Freshwater Overwater Structures, Treated Wood Issues, Marine and Estuarine Shoreline Modifications Issues, Channel Design, Ecological Issues in Floodplain and Riparian Corridors, and Marine Dredging*. WDFW white papers on *Water Crossings* and *Freshwater Sand* and *Gravel Removal* were scheduled for completion in the fall of 2001.

Forests & Fish Agreement

Forestry has long been a mainstay of Washington's economy, but cutting timber can also have significant impacts – both positive and negative – on fish, wildlife and their habitat. Concerned about declining salmonid populations and the growing number of forested streams with impaired water quality, WDFW joined with timberland owners, environmental groups, treaty tribes, local governments, and other state and federal agencies in 1997 to propose changes to state forest practice rules that provide greater protection for aquatic and riparian habitat on non-federal forest lands.

Participants in the negotiations outlined their recommendations in the *Forests and Fish Report*, which was adopted into law (ESHB 2091) by the state Legislature in June of 1999. The landmark accord sets higher standards for logging practices and road maintenance over the next 50 years, while also ensuring that forest landowners receive the technical support they need to comply with the new rules. It also includes an "adaptive management" provision, which allows for adjustments in forestry rules as new scientific information becomes available.

Having played a major role in negotiating the accord, WDFW dedicated nine staff members to help implement its provisions during the 1999-01 Biennium. Key contributions include:

- **Policy development:** Through its new position on the Forest Practices Board and its involvement as a key stakeholder, WDFW participated throughout the biennium in developing guidelines for specific forest practices consistent with legislation. These guidelines include provisions for stream buffers, channel migration, forest roads, unstable slopes, slash clearing, streamside management and other forest practices that affect habitat for fish and wildlife.
- **Scientific research:** A cornerstone of the Forests and Fish agreement was the concept of "adaptive management," which allows for adjustments in forestry rules as new scientific information becomes available. The chief scientist for WDFW's Habitat Program co-chairs the Cooperative Monitoring, Evaluation and Research panel, which oversees all research conducted under the Forests and Fish Agreement, WDFW also initiated several key studies to evaluate the effectiveness of the new forestry rules in protecting aquatic habitat.
- **Technical assistance:** During the 1999-01 Biennium, WDFW habitat biologists assessed hundreds of culverts and other fish-passage barriers on forest lands, identifying dozens in need of correction. They also worked with the state Department of Natural Resources (DNR) to review forest road maintenance and abandonment plans, and helped to develop a single application for projects that require a Forest Practices Permit from DNR and Hydraulic Project Approval (HPA) from WDFW. The Department was also working on a matrix that cross-references all water-related forest-practice rules with hydraulics rules to determine where integration is possible.
- **Landowner assistance:** WDFW biologists worked one-on-one with forest landowners – particularly those with small properties – to develop plans to meet habitat-protection objectives on a site-specific basis. This type of assistance was a key provision of the original agreement, and WDFW dedicated staff to meet this commitment. The goal is to meet resource-protection requirements while providing flexibility for individual landowners.

Regulatory Services

Besides working to restore habitat for fish and wildlife, WDFW also administers two regulatory programs designed by the state Legislature to prevent or mitigate further damage to the environment. In the 1999-01 Biennium, the Regulatory Services section of the Habitat Program gave advice and took action on thousands of projects governed by the State Environmental Policy Act (SEPA) and the Hydraulic Project Approval (HPA) programs, providing recommendations to agency staff and property owners throughout the state.

SEPA and HPA

WDFW is one of several state agencies responsible for reviewing projects under SEPA, which was adopted into law in 1971 to ensure that environmental values and natural science receive consideration in any project or

Weirs installed at Goldsborough Creek create a gentle cascade where an aging wooden dam formerly presented a formidable barrier to migrating fish. Project partners included WDFW, the Army Corps of Engineers and Simpson Timber.

activity that may have an impact on the environment. During the 1999-01 Biennium, WDFW made 220 determinations of environmental significance or non-significance under the SEPA law and reviewed hundreds of other proposals. The number of formal determinations was down slightly from the previous biennium, when WDFW took action on 250 proposals.

The state's Hydraulic Code, which became law in 1949, was specifically designed to protect the state's fish resources. The code requires a permit – a hydraulic project approval (HPA) – from WDFW for any project that will "use, divert, obstruct or change the natural flow or bed of any of the salt or fresh waters of the state."

During the 1999-01 Biennium, WDFW reviewed more than 8,000 project proposals for impacts to fish and fish habitat and approved approximately 6,000 HPAs, all of which included measures to eliminate or mitigate those impacts. The number of HPAs issued reflects a decrease of approximately 25% from the previous biennium, due primarily to WDFW's efforts to streamline the permit process without sacrificing protection of the resource. For example, WDFW distributed more than 5,000 pamphlet HPAs outlining rules and procedures for small-scale mining activities in streams during the course of the biennium. Individuals who comply with the standards set forth in the pamphlet are not required to obtain an individual HPA permit. Similar programmatic approaches to HPAs have been developed to address projects involving beaver dams, removal of debris adjacent to culverts and maintenance of fishways and boat ramp access.

As population growth encroaches into the remaining areas of suitable fish habitat, project reviews and mitigation requirements have become increasingly complex. Thus, while the number of HPAs declined from earlier years, workload pressures on agency staff remain high – particularly in the Puget Sound and coastal regions.

Streamlining Transportation Permits

Transportation is a vital component of Washington's economic health, but roads, bridges and other transportation projects can significantly affect the state's fish and wildlife resources. Pursuant to Engrossed Senate Bill 6188, WDFW worked during the 1999-01 Biennium to facilitate the planning and development of transportation projects while ensuring protection of fish and wildlife habitat.

Two biologists joined the Habitat Program to help streamline the permit process for state transportation projects under ESB 6188, and the Department anticipated adding three additional biologists in the 2001-03 Biennium. The Department's goal is to create an expedited environmental permitting process for transportation projects of statewide significance and streamline the permit process through increased use of programmatic or general permits. This effort is being conducted in cooperation with state and local agencies, Indian tribes, environmental organizations and the business community.

WDFW also assisted the Washington State Department of Transportation (WSDOT) in developing alternative mitigation to offset environmental impacts, and worked with WSDOT and the state Department of Ecology to revise WSDOT's *Highway Runoff Manual* – an effort designed to streamline transportation projects with stormwater considerations.

In addition, WDFW liaisons have been able to help resolve disputes on individual projects between regional staff from both agencies, including the Highway 202 bridge over the Snoqualmie River where such efforts allowed WSDOT to meet its work schedule. Up-front reviews by WDFW of such projects as I-405 in eastern King County and I-104 in Kitsap County have also helped to head off potential conflicts between the two agencies.

Major Projects

There are nearly one thousand dams of various types in Washington State, ranging in size from the massive hydroelectric dams on the Columbia River to small irrigation dams no more than a few feet high. While most of these structures serve a useful purpose, many also present a significant barrier to the migration of native salmon.

WDFW has little direct control over most dams and other energy projects, but it does provide scientific recommendations to the Federal Energy Regulatory Commission and other federal agencies that license them. During the 1999-01 Biennium, the Major Projects section of the Habitat Program provided technical guidance on more than 150 energy projects, including hydroelectric dams, water supply and flood control dams, combustion gas turbine plants, petroleum pipelines, natural gas pipelines, nuclear projects and wind farms.

Consistent with its responsibilities under state law, WDFW recommended ways to avoid, minimize or compensate for damage to fish, wildlife and their habitat from energy facilities and other major development. Significant accomplishments of the Major Projects section during the 1999-01 Biennium include helping to secure:

- Help to renegotiate an agreement in 1999 with PacifiCorp to remove Condit Dam from the White Salmon River in 2006. This project, which involves the largest dam scheduled for removal in the nation, will open up 25 miles of spawning habitat for salmon;
- Congressional approval for $5 million in fish passage improvements at Wynoochee Dam, including fish screens and a fish-bypass system;
- Improved instream flows below Cushman Dam for steelhead, coho, chinook and sea-run cutthroat;
- 1,100 acres of wildlife mitigation land associated with the Lewis River Project, involving Merwin, Yale, and Swift dams;
- A new license for the Nisqually Project that includes 3,500 acres of wildlife mitigation land and the release of 500,000 kokanee into the reservoir;

WDFW biologists and volunteers net fish stranded during a major stream renovation project on Goldsborough Creek in Mason County. Completed in 2001, the project is expected to open up 14 miles of prime salmon-spawning habitat.

- Improved fish passage at the Ballard Locks in Seattle for steelhead, sockeye, coho, and chinook; and
- A study of the smolt passage problems at the Toutle River Sediment Retention Structure.

WDFW was also one of three major partners in the removal of Goldsborough Dam, an unused, 80-year-old structure in Mason County that blocked passage to 14 miles of ideal spawning habitat upstream. Other partners included the U.S. Army Corps of Engineers and Simpson Timber, the dam's owner, both of which shared in the costs of removing the dam and restoring the stream. The Major Projects section provided state oversight on the project and work was completed – on schedule – in the fall of 2001. Newly rehabilitated, Goldsborough Creek is eventually expected to support an additional 2,000 adult coho salmon, 10,000 chum salmon and hundreds of steelhead and sea-run cutthroat trout every year.

Oil Spill Team

The WDFW Oil Spill Response Team works closely with the state Department of Ecology, the U.S. Coast Guard, and other agencies to mitigate damages to fish, wildlife and their habitats caused by petroleum spills in state waters. Key responsibilities include:

- Conducting 24-hour spill response and management.
- Representing fish and wildlife resources within the state's Incident Command structure.
- Response preparedness through contingency planning and drills.
- Providing expertise and training assistance to petroleum-related industry and businesses.
- Oiled shoreline clean-up.
- Oiled wildlife rescue and rehabilitation.
- Baseline data collection and natural resource damage assessments.
- Spill settlement negotiation and restoration.

During the 1999-01 Biennium, the six-member Spill Team responded to 260 reports of petroleum spills, including the grounding of a barge carrying 2.5 million gallons of gasoline on the Columbia River and the rupture of a pipeline that spilled over 225,000 gallons of gasoline in Whatcom Creek in Bellingham. The Whatcom Creek spill and the fire it sparked was the most serious incident during the course of the biennium, killing three people, burning 25 acres of riparian and mature forest habitat and destroying all terrestrial and aquatic organisms for nearly three miles along the stream.

In the aftermath of the Whatcom Creek spill, the Spill Team conducted a damage assessment and began working with the responsible party and trustees to develop a restoration plan. In all, the Spill Team worked on 75 damage assessment cases during the biennium. Team members also were actively involved in negotiating and approving a variety of restoration projects, including the implementation of the Tenyo Maru Restoration Plan, spartina removal and the purchase of 450 acres of habitat.

There were no catastrophic spills off the Washington coast of the magnitude of the Nestucca spill in 1988 or the Tenyo Maru spill in 1991, when thousands of oiled seabirds died. However, the Spill Team did help coordinate wildlife rescue efforts following several smaller spills. In one spill near Port Angeles, oiled birds were collected, treated, rehabilitated, and released back to the wild.

As a step toward improving the state's wildlife rescue capabilities, the Spill Team completed a pre-design study of an "Oiled Wildlife Rescue Center" in conjunction with the Washington Wildlife Rescue Coalition. The team also continued efforts to develop partnerships with local, state, public and private entities for funding of the center.

Habitat Science

Reversing decades of habitat losses for fish and wildlife requires more than just dedication and hard work on the part of biologists, engineers, landowners, administrators and volunteers. At a time when watershed groups throughout the state are competing for limited funding and resource policies can affect entire communities, decision-makers need to rely on hard science, not hunches or good intentions.

Many critical resource-management issues addressed during the 1999-01 Biennium rely on information provided by the Science Division within WDFW's Habitat Program. With 14 FTE staff, the division coordinated a variety of research activities, many integral to the state's salmon-recovery effort.

One major research effort initiated during the biennium will provide the scientific foundation for the "adaptive management" provision of the Forests and Fish Agreement. Another helped local planning units establish stream flows to ensure sufficient water for fish passage, while a third has led to the development of a map-based GIS database to help decision-makers prioritize salmon-recovery projects in local watersheds. In addition, division staff helped to oversee the development of a WDFW Corporate Data System, used to manage natural resources across the state.

Adaptive Management

A cornerstone of the Forests and Fish Agreement was the concept of "adaptive management," which allows for adjustments in forestry rules as new scientific information becomes available. This requires managers to identify uncertainties about impacts to natural resources from timber harvests, then prioritize research projects to address questions and coordinate those projects.

The chief scientist for WDFW's Habitat Program co-chairs the Cooperative Monitoring, Evaluation and Research (CMER) panel, which oversees all research conducted under the agreement. Other CMER stakeholders include the state departments of Ecology and Natural Resources; the National Marine Fisheries Service, the U.S. Fish & Wildlife Service and the Environmental Protection Agency; treaty tribes, the timber industry and environmental organizations.

Two WDFW scientists with approximately $400,000 in state grants coordinated several research projects designed to clarify issues with a bearing on the "adaptive management" provision of the Forests and Fish Agreement. They include studies to determine:

- Hydrological characteristics of non-fish-bearing streams, which will influence the development of rules governing timber harvests and the protection of these streams.
- Minimum basin sizes needed to form a stream with perennial flow, which has a bearing on timber harvests near streams that may provide habitat for amphibians.
- The value of seep habitat to amphibians at the headwaters of streams.
- Growth potential of trees in various types of soil, which affects buffer distances needed around different streams.
- The effectiveness of timber harvest rules in keeping water temperatures cool enough to support bull trout.

Some of these studies are expected to show results by the end of 2002, while others will take more time. Four to eight seasonal employees and several work-study students assisted in these research efforts during the 1999-01 Biennium.

Instream Flow

The purpose of the instream flow section of the Habitat Program's Science Division is to determine how water flows in streams affect fish habitat, and to provide technical assistance in establishing instream flows to watershed management planning units and other entities working to manage water, stream flow, and fish habitat. During the biennium, 1.5 FTE staff members:

- Conducted instream flow studies in the Walla Walla, Chehalis, and Cowlitz river basins.
- Provided technical guidance on instream flow studies conducted for watershed management planning in the Samish and Nooksack basins.
- Conducted reconnaissance instream flow evaluations of the San Juan Islands (WRIA 2).
- Provided technical presentations to watershed management planning units for the northwest Olympic Peninsula (WRIA 19 and 20); Elwha River, Morse Creek, and Dungeness River; Columbia Gorge (WRIA 29 and 30); and the Walla Walla, Colville, and Pend Oreille basins.
- Provided technical assistance in discussions leading toward Habitat Conservation Plans for mid-Columbia tributaries, including the Methow River system.
- Conducted a field study in the Quilcene River to validate and extend study done earlier.
- Coordinated with the Instream Flow Council, an international organization of instream flow specialists, to develop guidelines for managing instream flows.
- Worked with hydroelectric utilities to resolve instream flow and ESA fish passage issues on the Cowlitz River.
- Began research to integrate riparian land use, water quality (temperature), and instream flow concerns.

SSHIAP Database

In the realm of GIS data systems, Habitat Program scientists in cooperation with tribal co-managers continued development of a map-based fish and aquatic habitat database to assist in salmon recovery. The system created by the Salmon and Steelhead Habitat Inventory and Assessment Project (SSHIAP) provides a digital representation of streams and rivers in Washington, including information about stream gradients, blockages and known fish populations.

Throughout the biennium, fish and habitat data were collected and assembled for 30 of Washington's 62 Watershed Resource Inventory Areas (WRIAs), with current efforts focused in the lower Columbia River for use in recovery planning of listed salmonids.

Stream Map Created from SSHIAP Data

SSHIAP data will help identify and prioritize areas across the state for salmon recovery projects, thus ensuring effective expenditure of public funds. Contributors to the data collection include the Washington State Department of Transportation, State Conservation Commission and Puget Sound tribes.

Habitat Research Publications

The publications that follow are a sampling of research projects published by WDFW Habitat Program staff members during the 1999-01 Biennium.

Vadas, R.L. Jr., and D.J. Orth. 2001. Formulation of habitat-suitability models for stream-fish guilds: do the standard methods work? Transactions of the American Fisheries Society 130: 217-235.

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